

*IPIECA
REPORT
SERIES*

*VOLUME
FOURTEEN*

GUIDE TO TIERED PREPAREDNESS AND RESPONSE



GUIDE TO TIERED PREPAREDNESS AND RESPONSE



International Petroleum Industry Environmental Conservation Association
5th Floor, 209–215 Blackfriars Road, London, SE1 8NL, United Kingdom
Telephone: +44 (0)20 7633 2388 Facsimile: +44 (0)20 7633 2389
E-mail: info@ipieca.org Internet: www.ipieca.org

© IPIECA 2007. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior consent of IPIECA.

This publication is printed on paper manufactured from fibre obtained from sustainably grown softwood forests and bleached without any damage to the environment.

CONTENTS

- 2 PREFACE**
- 3 INTRODUCTION**
- 5 TIERED PREPAREDNESS AND RESPONSE**
- 9 TIER 1**
- 11 TIER 2**
- 14 TIER 3**
- 18 WORKING TOGETHER**
- 20 CONCLUSIONS**
- 21 ILLUSTRATIONS**
- 26 ACKNOWLEDGEMENTS**
- 27 FURTHER READING**

PREFACE

This report is one of a series produced by the International Petroleum Industry Environmental Conservation Association (IPIECA). The full series of reports will represent the IPIECA member's collective contribution to the global discussion on oil spill preparedness and response. In preparing these reports IPIECA has been guided by a set of principles which every organization should consider when managing operations related to the transportation, handling and storage of petroleum and petroleum products:

- It is of paramount importance to concentrate on preventing spills.
- Safety of life is the highest priority in any incident.
- Despite the best efforts of individual organizations, spills will continue to occur and will affect the local environment.
- Response to spills should seek to minimize the severity of the environmental damage and to hasten the recovery of any damaged ecosystem.
- The response should always seek to complement and make use of natural forces to the fullest extent practicable.

This report supersedes *The Use of International Oil Industry Spill Response Resources: Tier 3 Centres*. It describes the principles of Tiered Preparedness and Response, and provides guidance on designing and building oil spill response capabilities. Following these principles will assist in the development of suitable capabilities commensurate with the oil spill risk at the local, regional, national and international levels. The conventional view of defining tier levels has been focused around the volume of oil spilled and location of the spill. However, in practice it is a more complex challenge, with a wide range of factors influencing the level of capability required and the boundaries between these tiers. Drawing on the principles of the Tiered Preparedness and Response approach, and also the OPRC Convention, industry and government have an internationally recognized, efficient and highly effective framework for working together to build preparedness and response capabilities that match the oil spill risks prevailing in any situation worldwide.

INTRODUCTION

There is a long-standing, internationally recognized system employed for categorizing and structuring levels of oil spill preparedness and response. It was developed originally by the oil industry in the 1980s as a means to ensure that an appropriate response capability was available to deal with oil spills commensurate to the risks. The approach established the principle of Tiered Preparedness and Response, whereby appropriate resources can be mobilized rapidly and escalated to provide an effective response to any oil spill.

The International Maritime Organization (IMO) has since developed an international Convention that sets out clearly the principles for establishing national oil spill preparedness and response capabilities. The Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) encourages States to develop and maintain a national response system and to facilitate international cooperation and mutual assistance when preparing for and responding to major pollution incidents. The Convention sets out a range of commitments on building levels of oil spill preparedness, which primarily include:

- Developing a national system for responding promptly and effectively to pollution incidents (oil and hazardous and noxious substances).
- Designating a national authority to be responsible for preparedness and response, and to act as a focal point for requesting and rendering assistance.
- Developing a national oil spill contingency plan and ensuring operators have contingency plans that are coordinated with the national response system.
- Establishing a minimum level of pre-positioned response equipment commensurate with risk.
- Developing a programme of exercises and training.
- Facilitating international cooperation and mutual assistance by establishing, either individually or through bilateral or multilateral cooperation, mechanisms for coordinating response operations.

Tiered Preparedness and Response is consistent with the OPRC Convention and taken together, they offer government and all sectors of the oil industry a structured approach to establishing oil spill preparedness and response arrangements.

For the oil industry, historically it has been the shipping sector and oil company corporate headquarters that have most strongly driven oil spill preparedness and response arrangements. Over the past 30 years the occurrence of major oil spills resulting from shipping accidents has fallen





Tiered Preparedness and Response can be applied to all potential oil spills, from small operational spillages to a worst case, at sea or on land.

dramatically. More recently, corporate-led oil spill arrangements have been supplemented by more divergent business unit or regional led arrangements. This shift has coincided with strong growth in exploration and production activities in ever more remote, environmentally sensitive and potentially challenging places. The global oil spill risk profile is constantly changing and the need to ensure that appropriate arrangements are in place is just as relevant now as it ever has been.

Tiered Preparedness and Response can be applied to all potential oil spills, from small operational spillages to a worst case, at sea or on land. It is essential that governments and the oil industry work in **partnership** to establish integrated response arrangements and capability, thereby ensuring that together they are able to respond effectively to an oil spill of any magnitude. The tiered approach represents the best opportunity to structure and build these preparedness and response arrangements in a consistent and effective manner that facilitates the integration of global response resources.

The type of environmental and socio-economic sensitivities at potential risk will influence the resources deemed necessary at each tier level.



TIERED PREPAREDNESS AND RESPONSE

Tiered Preparedness and Response gives a structured approach to both establishing oil spill preparedness and undertaking a response. It allows potential oil spill incidents to be categorized in terms of their potential severity and the capabilities that need to be in place to respond.

Conventionally the concept has been considered as a function of **size** and **location** of a potential oil spill, with three tiers typically defined. Tier 1 spills are operational in nature occurring at or near an operator’s own facilities, as a consequence of its own activities. The individual operator is expected to respond with their own resources. Tier 2 spills are most likely to extend outside the remit of the Tier 1 response area and possibly be larger in size, where additional resources are needed from a variety of potential sources and a broader range of stakeholders may be involved in the response. Tier 3 spills are those that, due to their scale and likelihood to cause major impacts, call for substantial further resources from a range of national and international sources.

While this conventional definition gives useful criteria for considering a structured approach to preparedness and response, in practice there are potentially many factors that may influence the actual response capability needed and where the boundaries between tiers are set.

large spill			Tier 3
		Tier 2	
	Tier 1		
medium spill			
small spill			
	local	regional	remote
	proximity to operations		

Figure 1

The conventional definition of Tiered Preparedness and Response.



Tier 1 spills are generally small in size, affect only a local area and may be dealt with by the individual operator.



Tier 3 spills, due to their scale and likely major impacts, need substantial response resources from national and/or international sources.

Factors to consider

Influencing factors will vary between different locations and operations, and their perceived importance may be viewed differently by the operators, governmental authorities and other stakeholders. As a result, it is entirely feasible that contrasting tiered capabilities could be established for different operations in the same locality or the same type of operation in different localities. The factors described in this report represent a good cross-section of those that often influence the design of response capabilities. It is inevitable that not all the factors presented here will be relevant for every situation and there may be others that are critical to the circumstances prevailing in a specific case.

Table 1

Examples of factors influencing the response capability needed and where the boundaries between tiers are set.

Operational	<ul style="list-style-type: none"> ● Probability and frequency of an oil spill occurring ● Spill volume ● Oil type ● Impact of the spill on business operations ● Feasibility to mount a safe, credible response 	<p>Despite all preventive steps being taken, an oil spill risk will always remain. This risk needs to be catered for by designing and building oil spill preparedness. However, some operations carry with them inherent restrictions on feasible response options. For example, onboard a vessel preparedness may entail principally the notification of an incident to relevant authorities. In contrast, a port, a network of offshore production facilities or a single refinery, would each potentially have different levels of capability in place.</p>
Setting	<ul style="list-style-type: none"> ● Proximity of the spill to operations ● Climate, weather or operating conditions altering fate and behaviour of oil or impeding response operations ● Proximity to sensitive environments ● Proximity to socio-economic resources 	<p>Prevailing conditions that determine the behaviour/fate of oil and along with the type of environmental and socio-economic sensitivities at potential risk, will strongly influence the type and capability of on-site resources. Thus in areas where potentially severe consequences could arise, the response capabilities at Tier 1 or Tier 2 levels could be significantly greater than for similar geographic areas that have a much lower risk attached to them.</p>
Response capability	<ul style="list-style-type: none"> ● Tier 1 resources influenced by budgetary commitments, provision of personnel and logistics ● Availability and capability of regional Tier 2 options ● Access to Tier 3 support 	<p>The presence or absence of, for example, an appropriate Tier 2 arrangement will strongly influence the capability required at the local Tier 1 level and the need to have ready access to Tier 3 resources. Thus, a Tier 1 capability may need to be built in one locality that would more closely resemble a Tier 2 capability elsewhere. Similarly for example, in particularly remote settings, where assistance from outside the area is extremely difficult to facilitate, or would take significant time to arrive, a Tier 1 capability may be needed that more commonly resembles Tier 3 resources elsewhere.</p>
Legislative	<ul style="list-style-type: none"> ● Political stability and culture of host country ● Governmental requirements for specific response actions or performance criteria ● Influences of national, provincial or local government authorities ● Stipulated subscription to designated Tier 2 or Tier 3 support 	<p>Legislative and regulatory controls may dictate Tier 1 capabilities and also Tier 2 and Tier 3 arrangements. In some cases these requirements may not match the risk-based approach underlying Tiered Preparedness and Response.</p>

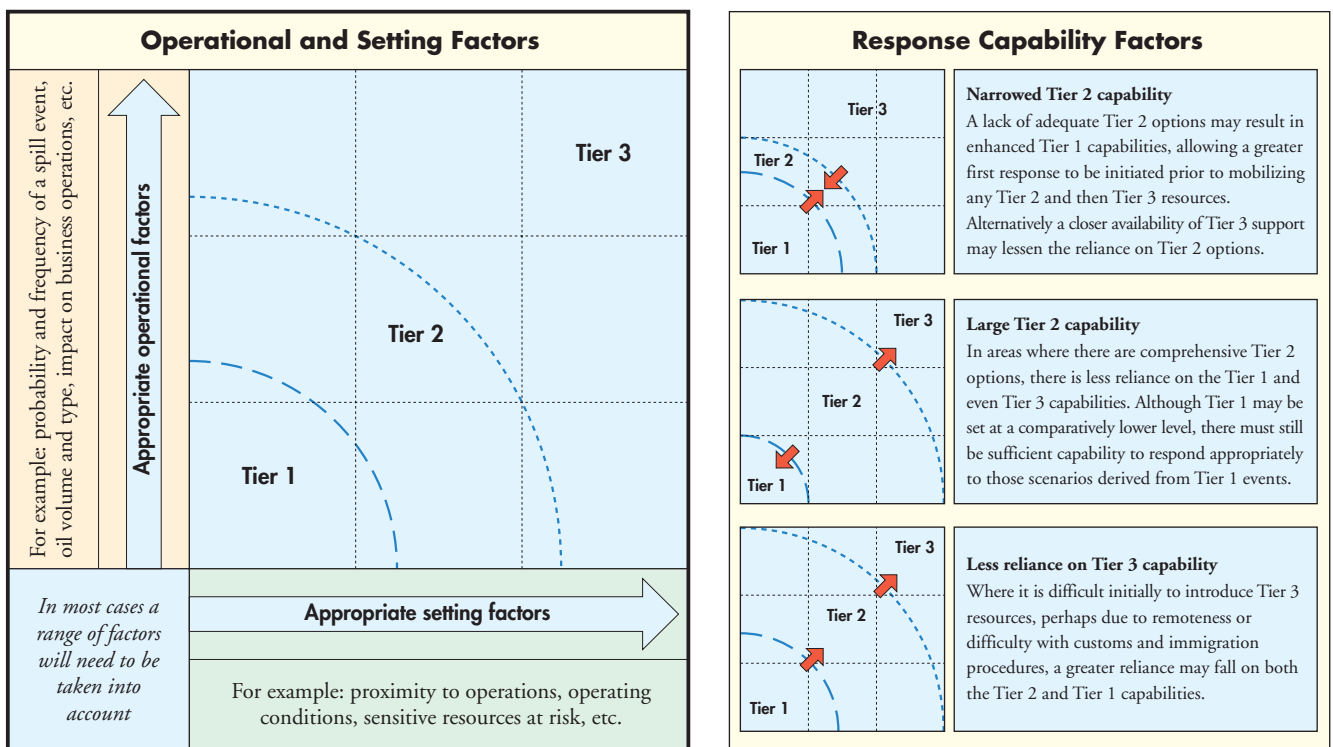
Risk management

The process of defining the tiers of capability and the boundaries between them is part of a wider risk management strategy; ensuring that all potential risks are as low as practicable and taking measures to mitigate the residual consequences. The **events** that may lead to oil spills can be identified, from which indicative scenarios can be developed. These **scenarios** can be categorized in terms of likelihood of occurrence and potential impact, taking into account the prevailing operational and setting factors, allowing the oil spill risk to be determined.

By considering scenarios in these terms, a tiered response capability can begin to be designed that is commensurate with the identified risk. For example those scenarios with a high probability to occur but with a small impact are most likely to be deemed as a Tier 1. In contrast a spill event that, despite having a potentially major impact, has an exceptionally low probability would most likely be categorized as a Tier 3. Then, by taking into account other factors such as those related to the availability of Tier 2 and Tier 3 capabilities, along with any legislative factors, tiered capabilities can be designed and the boundaries between tier levels defined.

Figure 2

The full definition of Tiered Preparedness and Response showing the influence of factors.



Legislative Factors

- Certain response capabilities may be set by governmental authorities that may not match the risk-based approach underlying Tiered Preparedness and Response.
- The planner may be influenced in the design of response capabilities by the presence of legislative controls and/or the existence of pollution-related penalties.



The design of tiered capabilities is influenced by a range of factors including the setting and operational activity.



There are no rigid rules for categorizing scenarios in terms of a tiered **capability** to respond. The challenge for the planner is to look at the events that may arise and how the scenarios may develop, and then make decisions, in conjunction with the stakeholders involved and based on the factors perceived of greatest significance, on the capability required at Tier 1 and on the necessary arrangements at Tier 2 and Tier 3 levels. Through a process of balanced judgement, tiered capabilities can be set at appropriate levels.

The various factors can have a significant influence on where the **boundaries** are set between the tiers. As an illustration, a small spill of persistent oil in a highly sensitive area may well require substantially more resources than a much larger spill of a less persistent oil in a less sensitive area. It is imperative that the factors pertaining to the oil operations under consideration and the potential impacts arising from the scenarios are properly reviewed when designing a tiered capability. As the planner moves beyond designing a Tier 1 capability, the scenarios become ever more varied, and defining the boundaries between the subsequent tiers becomes increasingly one of best judgement based on all the factors and the potential influence of all the various stakeholders involved.

By taking all relevant factors into account, the capabilities at each tier level and the boundary between them can be determined. In this process it is vital to define clearly the roles and responsibilities of all stakeholders involved and their contribution to each tier of capability. The overall aim is to establish manageable resources at the Tier 1 level that are appropriate to the perceived risk, and for these same resources to be used as a first response until additional support from the higher tiers is integrated effectively for the more severe oil spills.

The fundamental components of preparedness are consistent across all tiers of capability and include:

- **A management framework** defining the roles and responsibilities of the various stakeholders potentially involved in the range of different oil spill scenarios.
- **An oil spill contingency plan** that sets out the essential elements for a successful response and the processes for managing the integration of local, regional, national and international resources as appropriate.
- **Response strategies** set in generic terms for the various areas of operation and in detail for particular areas of high environmental or socio-economic importance.
- **On-site equipment** commensurate with the Tier 1 risk available at all times.
- **Arrangements for the integration of additional support** at all tier levels.
- **Logistical arrangements** to facilitate and support response operations across all tier levels.
- **Trained practitioners** in oil spill response both on-site and also at the Tier 2 and Tier 3 levels.
- **Programme of simulation exercises** to test different aspects of preparedness, build familiarity and ensure competence.

TIER 1 PREPAREDNESS AND RESPONSE

Tier 1 events are characterized as being related generally to operational activities at a fixed location or facility. Such events may result, for example, from the overfilling of a tank or a leaking valve. In essence a Tier 1 event arises from disruptions in routine operations that typically result in small quantities of oil being spilled within the confines of a facility and having a relatively minor impact. As such, a relatively modest on-site capability is mostly sufficient for such events.

In reality, however, some Tier 1 events may require a comparatively larger capability depending on the factors that may influence the scenarios that develop. As an illustration, a small spill from a jetty located in a sensitive estuarine area may result in a large Tier 1 capability being required to deal with the oil that would otherwise be carried by currents and impact extensive lengths of riverbank and coastal shores. Conversely, an oil spill where a much larger volume is released can also be termed a Tier 1 scenario. For example, at a refinery there may be a substantial loss of oil from a storage tank which is contained within a bund, and thus is likely to be within the capability of Tier 1 resources.



A substantial loss of oil from a storage tank contained in a bund is likely to be within the capability of Tier 1 resources.

Tier 1 capability and resources

In making the final decision on determining the Tier 1 capability the planner must consider the range of factors that may influence each scenario. A Tier 1 capability can vary considerably in terms of planning, equipment, people and also expense from one operational setting to another. Regardless of the variations, however, the same basic components would feature in most cases, including principally the provisions of local resources of trained people and specialized locally-sited equipment maintained in readiness for a rapid and effective response.

Typical elements of a Tier 1 capability	
Spill assessment and notification	<p>A systemized approach to assess/confirm the potential severity and to alert personnel and departments.</p> <ul style="list-style-type: none"> ● Checklists to support the oil spill assessment and characterization ● Guidelines to assist in confirming the required tier of response ● Checklists of people and resources to alert/mobilize
Roles and responsibilities	<p>A Tier 1 oil spill would need a relatively modest response workforce.</p> <ul style="list-style-type: none"> ● Roles clearly defined for all areas of responsibility: <ul style="list-style-type: none"> • management oversight • directing field activities • hands-on operations ● Depending on the circumstances, these roles and responsibilities may be delegated or indeed shared in a variety of ways
Prescriptive actions	<p>Many precautionary safety measures and response actions can be pre-scripted, subject to a straightforward and rapid assessment of key features to confirm their applicability.</p> <ul style="list-style-type: none"> ● Health and safety features addressed immediately and on an ongoing basis ● Securing the spill source as quickly as possible if feasible and safe to do so ● Containment of the situation is often a top priority ● A rapid response with pre-determined strategies, prioritized sites for protection, clean-up techniques and designated equipment ● A focus on achieving normal working conditions and recovery of business/operations as soon as possible
Equipment	<p>On-site equipment needs to be suitably located with arrangements in place for rapid and effective mobilization.</p> <ul style="list-style-type: none"> ● Amount and type commensurate with risk ● Deployment times and methodology predetermined ● Supporting logistics guaranteed ● Equipment to be well maintained
Responders	<p>Response staff are most likely to be based on site and available for emergencies in addition to their normal duties.</p>
Training	<p>Personnel need to be trained for their role so that they can respond promptly and effectively, as part of the overall contingency arrangement.</p> <ul style="list-style-type: none"> ● Defined programmes, with regular refresher courses ● Training focused on ensuring a suitable competence, and not just awareness or increased level of knowledge ● Training should include a specific assessment to test competence
Exercises	<p>Exercises fulfil the very same purposes across all tiers of preparedness and response. The range of issues that need to be learnt, tested and confirmed becomes increasingly broad and complex, but their underlying features remain unchanged.</p> <ul style="list-style-type: none"> ● To illustrate and reinforce the learning experiences offered in training ● To test and validate an individual's competence to perform their designated role ● To practice the collaborative effort of the response team and strengthen working relationships ● Offering a 'safe' environment to test the contingency arrangements, learn where elements need to be changed and then improve and strengthen the designated level of capability
External support	<p>Some elements of a Tier 1 capability may not be kept permanently on site but instead be readily available at the time of need.</p> <ul style="list-style-type: none"> ● Additional contracted labour ● Non-specialized equipment such as waste skips, storage trucks, personnel transport, etc. ● Support/infrastructure elements such as additional security, accommodation, catering provisions, etc.
Escalation	<p>Processes need to be in place to integrate additional resources into the spill response.</p> <ul style="list-style-type: none"> ● Policy for ready escalation followed by rapid downscaling if not required ● Assessment process to establish when to escalate ● Mechanisms for ready access to additional response resources ● Strengthening the spill management arrangements ● Facilitate the arrival and deployment of additional equipment and personnel

TIER 2 PREPAREDNESS AND RESPONSE

Beyond the limits of a defined Tier 1 capability, planning is required that encompasses a Tier 2 arrangement. By the very nature and variety of circumstances that may arise, Tier 2 events cannot be characterized simply in terms of a volume of oil spilled. The factors that were described and illustrated earlier become even more important in the design of a Tier 2 capability.

Tier 2 scenarios can develop in a number of ways, including for example:

- a spill which moves beyond the geographic remit of any local Tier 1 arrangement or an event occurring outside this geographical area;
- a Tier 1 event growing in scale and severity such that a Tier 1 capability is overwhelmed;
- the scale and severity of a Tier 1 event not being entirely clear and, as a result, Tier 2 resources potentially being needed as a precautionary measure;
- an event being initially classified as Tier 3, but as the situation develops it becomes clear a Tier 2 capability is sufficient;
- a major event where Tier 2 capability is mobilized prior to the arrival of Tier 3 resources.

In most situations, the boundaries between a Tier 1 and Tier 2 scenario are readily apparent. As an illustration, a spill from an offshore installation that extends beyond the designated remit of the installation's Tier 1 arrangement, will result in other stakeholders and response capabilities being engaged in a Tier 2 response.

Defining Tier 2 scenarios is dependent on the degree to which organizations have worked together to establish a credible, proven and sustainable Tier 2 arrangement. If there is a robust Tier 2 arrangement in place, then scenarios that go beyond a local Tier 1 capability can be readily dealt with, up to a pre-supposed boundary where additional Tier 3 resources would be needed. If there is an inadequate regional Tier 2 arrangement, or a gap between a pre-supposed Tier 2 scenario and any Tier 2 capabilities, then a greater emphasis by default is placed on Tier 1 capabilities together with access to Tier 3 resources.

The boundary between a Tier 2 and Tier 3 scenario is also dependent on the accessibility to Tier 3 resources. In areas where this is restricted, emphasis needs to be given to ensuring an appropriate Tier 2 capability is in place prior to any Tier 3 support arriving.



Tier 2 arrangements reflect the presence of organizations and response capabilities that can be called upon cooperatively.

Tier 2 capability

There are many ways to establish a Tier 2 capability and they can vary considerably in their structure and scope. Tier 2 arrangements should reflect the type of events covered, the scenarios that could develop, and the presence of organizations and response capabilities that could be called upon cooperatively. It is important to recognize that despite these apparent differences Tier 2 capabilities are generally composed of similar core elements. These are, in essence, the same as those of a Tier 1 capability, but modified for the prevailing circumstances.

Typical elements of a Tier 2 capability	
Spill assessment and notification	Similar in purpose to Tier 1, but with a wider remit and pre-agreed arrangements for mobilizing a broader range of stakeholders and additional resources.
Roles and responsibilities	A Tier 2 oil spill would involve a larger number of organizations and people for which clear roles and responsibilities need to be defined and agreed.
Prescriptive actions and response strategies	There will be some actions that can be triggered automatically when a Tier 2 oil spill arises. Given the scale and variety of such spills that could potentially arise, broader strategies need to be agreed in advance of a spill occurring. Through the defined roles and responsibilities, and pre-agreed management processes, these can then be turned into a set of agreed response actions for the actual spill being faced. Tactical sensitivity maps and clean-up guidelines may be utilized for a Tier 2 geographic area.
Equipment	Tier 1 resources can be used to mount an initial response, however additional equipment would be available from the Tier 2 arrangement, with a greater quantity and variety of both specialized and non-specialized equipment being available.
Responders	Some Tier 2 providers rely on dedicated response staff, while others have a network of available responders under contract. A locally sourced workforce may also be supervised by the Tier 2 provider in larger oil spills.
Training	All stakeholders and response personnel should be trained to carry out their designated functions following the same principles outlined for a Tier 1 capability.
Exercises	Exercises fulfil the very same purposes across all tiers of preparedness and response. However, the range of issues that need to be learnt, tested and confirmed becomes increasingly broad and complex. The underlying features remain unchanged, and key focus for Tier 2 exercises would be the integration of stakeholders and varied resources in an effective collaborative response.
External support	For any oil spill that by its nature is viewed as Tier 2, a much broader range of response activities will occur and resources be needed. Outside a facility in which a Tier 1 event may be more easily contained and dealt with, there are many different challenges facing the responders. Crucial among them is the logistical support necessary to ensure the response can be implemented effectively. This may involve the engagement of a broad range of service providers including marine service contractors, civil engineering and transportation companies, material suppliers, and accommodation, catering and welfare support. The network of organizations and resources in a Tier 2 arrangement is therefore much broader and more diverse than those featuring in a Tier 1 capability.
Escalation	Processes need to be in place to integrate additional resources into the spill response. <ul style="list-style-type: none"> ● Policy for ready escalation followed by rapid downscaling if not required ● Assessment process to establish when to escalate ● Mechanisms for ready access to additional response resources ● Strengthening the spill management arrangements ● Facilitate the arrival and deployment of additional equipment and personnel

Tier 2 resources

There are currently various illustrations worldwide of the way a Tier 2 capability can be established or provided. The recent expansion of oil activity into new and remote areas is creating new challenges for oil spill preparedness and response and the way in which Tier 2 resources are provided will continue to develop and evolve.

- **Mutual aid agreements between industry operators**—this enables Tier 1 capabilities of local operators to be combined with formal agreements in place for sharing defined resources in an oil spill. In releasing such resources, a minimum capability needs to be left to deal with any potential oil spill at each operator’s facility. This pre-agreement between the operators is essential to ensure that the release and integration of resources is a reliable and smooth process. A range of often more practical issues, such as the cost of equipment hire, transportation, storage and rehabilitation, and also the availability of staff to support the response, also need to be addressed.
- **Industry funded oil spill response cooperatives**—this comprises a jointly funded response facility, set up and run either by the oil industry itself or in conjunction with a commercial enterprise. Dedicated equipment and response personnel are sited in an appropriate and accessible location within the region that it serves. One feature of this is that a response capability can be developed with the appropriate level of resources commensurate with the oil spill risk. In some instances this comprises a single centre or stockpile, while in other cases there can be a series of stockpiles sited throughout a high risk area. The resources can be packaged so that they are easy to mobilize and transport locally and in the region.
- **Specialized Tier 2 services**—in most cases a range of response options are necessary to deal with the oil spill that may occur and the impacts that could arise. However, in some areas, circumstances prevail which may all be addressed by the provision of a more specific and focused response capability or service. An example of this would be where extensive exploration and production offshore activities cover a large geographic area, possibly encompassing international boundaries. Aerial reconnaissance and aircraft dispersant capabilities could be provided on a cooperative basis by all of the operators involved to address the potential spills.
- **Cooperation at the local/provincial government level**—cooperative arrangements can exist between a range of government bodies at local and provincial levels. These usually facilitate the sharing of what may in each case be relatively modest amounts of equipment and staff resources, but which together form an appropriate capability for the Tier 2 scenarios envisaged.



Tier 2 resources awaiting deployment at the scene of a spill.

Aircraft dispersant capabilities may be provided for a rapid response.



TIER 3 PREPAREDNESS AND RESPONSE



An offshore well blowout may involve an exceptionally large volume of spilled oil and could demand a Tier 3 response.

A Tier 3 oil spill event is broadly portrayed as one where all available local and additional Tier 2 resources are not enough to respond effectively to the scenario. As with any scenario that goes beyond a Tier 1, commonly there will be an extensive range of sensitivities impacted and stakeholders involved. The conventional view of a Tier 3 scenario is one involving an exceptionally large volume of spilled oil, for example from a major ship-sourced accident, an offshore or inland well blowout, or other such rare but highly significant event. In reality, a Tier 3 response may also be required for more modest volumes, perhaps where Tier 2 arrangements may be largely absent or overwhelmed, highly sensitive areas threatened, or highly-specialized strategies being required that are not available locally. With the growth of oil production activities in increasingly remote and sensitive areas, the need for additional Tier 3 support has become greater than generally perceived in the past.

The presence of strategically sited Tier 3 response providers worldwide offers the most effective and efficient means of establishing large quantities of specialized resources held in readiness to respond. The scale and rarity of such Tier 3 events means that they simply do not warrant such resources to be proliferated widely. There is no single model for the way in which resources are organized or for where exactly the stockpiles of equipment should be located. There are though differences in the way in which established Tier 3 resources are maintained and accessed for a response. However, they all have similar features, including clarity on their geographic area of response, funding mechanisms, access by membership or through contracted means, and the provision usually of both specialist equipment and trained people to fulfil a variety of roles and functions. In all cases, when they are called upon by industry or government, Tier 3 resources are designed to be mobilized rapidly and integrated effectively into any local response already under way.

In reality the term 'Tier 3 resources' is commonly used in a very flexible and all encompassing manner. It can refer to a national stockpile of equipment held by a government principally for domestic use but available also to neighbouring governments through an OPRC-styled cooperative arrangement. In addition, it can be used to describe an industry funded centre or network of resources held in readiness for international response, regionally or globally. It may also be used to describe elaborate, or indeed more basic, arrangements of resources accessible to a variety of possible users for national or international response efforts.

Tier 3 capability

There are some underlying features that are essential for a Tier 3 capability to work effectively.

Typical elements of a Tier 3 capability	
Spill assessment and notification	Similar in purpose to Tier 1 and 2, but with a wider remit and pre-agreed arrangements for mobilizing a broader range of stakeholders, and including usually a network of support with other Tier 3, Tier 2 and also government resources.
Roles and responsibilities	Similar to a Tier 2 but would involve an even larger number of organizations and people for which clear roles and responsibilities need to be defined and agreed.
Prescriptive actions and response strategies	As a Tier 3 oil spill may impact extensive areas, the response capability must be flexible offering a range of different options and equipment. Working together within an emergency response management system, these resources can be applied in the most effective manner to suit the circumstances of the particular scenario. Strategic sensitivity maps or generic clean-up guidance based on national policy may be utilized.
Equipment	By its very nature, a Tier 3 oil spill may encompass many different response challenges that require a variety of strategies and potentially a very broad range of equipment resources to be deployed. A Tier 3 provider can cater for this with the provision of substantial amounts of specialized equipment including large-scale aerial dispersant capabilities, extensive offshore containment and recovery equipment, ability to deploy protective booms for shoreline response, and a variety of shoreline and inland clean-up equipment and recovered oil storage capabilities. It is entirely feasible that in a Tier 3 oil spill much of this may need to be mobilized simultaneously. In addition a broad range of other 'support' resources may be held in readiness for those occasions where they may not be available locally, including communication systems, temporary shelters, protective clothing, etc. All this equipment is commonly stockpiled at a single location, or strategically at a network of sites, close to transportation links that facilitate rapid mobilization, and are often pre-packaged in suitable freight containers.
Responders	Some Tier 3 providers rely on dedicated response staff while others have a network of available responders under contract. On site, especially where extensive areas have been impacted, the Tier 3 responders will be involved in a range of activities, including handling specialized response equipment and directing operations, supervising a locally sourced workforce and generally supporting the management of the overall response at a command centre.
Training	All Tier 3 personnel should be trained in all oil spill response issues commensurate with the likely duties that they may perform in a Tier 3 response.
Exercises	Exercises fulfil the very same purpose across all tiers of preparedness and response. The range of issues that need to be learnt, tested and confirmed however, becomes increasingly broad and complex, especially at the Tier 3 level. The underlying features remain unchanged, and key issues for Tier 3 exercises encompass tests of the readiness to respond from the Tier 3 base; mobilization arrangements; transportation links including security and custom/immigration clearances; integration of resources into the local response organization; logistics, welfare and language issues; and the roles and responsibilities of the party mobilizing the Tier 3 response provider within the overall response management arrangements.
Funding mechanism	Tier 3 resources are extremely costly to set up and maintain, and are invariably funded on a not-for-profit basis. The most common arrangement is for potential users, for example oil companies, to subscribe through a membership sharing mechanism, providing access to these resources for a response within prescribed geographic areas, ranging from an individual facility or operation, through a country or region to a worldwide remit. Response services are available on a preferential basis to these members, but non-members may also request support upon agreeing contractual terms and there being sufficient resources available.
Network support	A diverse range of response activities will occur in a Tier 3 oil spill requiring an extensive range of specialized and also non-specialized equipment and resources. While the Tier 3 response provider offers a range of equipment and people to assist, there may be a need to draw in a range of other resources from more local sources that may encompass other Tier 3 providers, or indeed any available Tier 1 or Tier 2 capabilities. There is a variety of oil industry-promoted arrangements between the established Tier 3 and some Tier 2 service providers to facilitate this.
Integration	Processes need to be in place to integrate additional resources into the spill response. <ul style="list-style-type: none"> ● Policy for ready escalation followed by rapid downscaling if not required ● Assessment process to establish when to escalate ● Mechanisms for ready access to additional response resources ● Strengthening the spill management arrangements ● Facilitate the arrival and deployment of additional equipment and personnel

Tier 3 resources

The conventional manifestation of an industry Tier 3 resource has been one of a Response Centre offering a global or region-wide response capability. Over time the global oil spill risk profile has changed and the way in which Tier 3 resources are provided has evolved.

- **Tier 3 Response Centres**—globally there are a select few industry cooperative, international Tier 3 Response Centres, operating on a not-for-profit basis. Their location was originally influenced by the occurrence of major oil spills from shipping, these being perceived as the greatest risk. Since then their service remit has evolved and the membership and capability have changed. While stockpiles of equipment remain a key feature, emphasis has grown on the provision of expert staff for a range of preparedness and response services.

Tier 3 response centres		
<i>Name</i>	<i>Location</i>	<i>Area of operation</i>
Australian Marine Oil Spill Centre (AMOSC)	Victoria, South East Australia	Territorial Australia and South West Pacific
Clean Caribbean and Americas (CCA)	Florida, United States	Caribbean and Latin America
Oil Spill Response and East Asia Response Limited (OSRL/EARL)	Southampton in the United Kingdom, Singapore and Bahrain	Worldwide



Major stockpiles of equipment remain a key feature of Tier 3 resources.

The oil industry has also invested in a number of other major stockpiles, some of which may be used internationally. One example is the Marine Spill Response Corporation (MSRC), which has substantial resources distributed at strategic locations around the USA. Another such example is a network of centres strategically located throughout Brazil—Environmental Defence Centres (CDA)—for national response and international support across South America. Such response providers are commonly now part of a global response network offering coordinated support and assistance with international Tier 3 Response Centres and other organizations of similar status to themselves.

- **Stockpiles of resources in high risk areas**—smaller equipment stockpiles can be placed strategically in high risk areas on an international scale. One such example is that of the stockpiles established by the Petroleum Association of Japan (PAJ) along the major shipping route between Japan and the Middle East, to ensure a capability exists in or near many of the countries whose shores may be affected if there were to be an oil spill involving a passing tanker.

- **Governmental Tier 3 capabilities**—some governments have developed their own, substantial national stockpiles of specialized equipment for oil spill response. In some cases this reflects a particular desire to protect domestic coastal resources perceived to be of extreme importance. In most cases, however, it has been motivated by their exposure to major oil spills or being located in areas of internationally recognized high risk. The stockpiles in these cases are most often managed by a designated government agency, such as a Coastguard, but can also feature support and maintenance arrangements with commercial contractors.

In some geographic areas, the governments of neighbouring countries share a common oil spill risk. This risk may arise from their coastlines bounding a particular sea area, being in proximity to a major shipping route, or collectively hosting high exploration and production activities. Consistent with the OPRC Convention there may be various forms of bilateral or multilateral arrangements to facilitate the sharing of technical information and the provision of expertise and equipment in the field. The success of such arrangements relies on a mutual understanding of perceived risks, good working relationships between relevant government departments and genuine political commitment at the highest level to deliver support at the time of need. One practical feature that is also crucial to success is the existence of mechanisms to facilitate the rapid movement of people and equipment across national boundaries.



Governments of neighbouring countries which share a common risk may establish bilateral or multilateral agreements to facilitate international response support.

WORKING TOGETHER



All elements of Tiered Preparedness and Response need to be considered at the contingency planning stage; periodic reviews, training and oil spill simulation exercises are also essential to ensure response personnel are adequately prepared.

The design of a tiered capability and the factors that can influence this have been described throughout this report. By following a collaborative approach with all stakeholders likely to be involved, the most appropriate arrangements can be built for a particular situation. The overall aim is to set in place a degree of preparedness that is commensurate with the risks under scrutiny. There are likely to be some assumptions, estimations and possibly compromises needed, to ensure that what is in place is appropriate and represents the most cost-efficient investment at each tier level.

All elements of Tiered Preparedness and Response need to be considered at the contingency planning stage, where risks are identified, response strategies set, resourcing requirements addressed and capabilities established. Through training and joint exercises all aspects of Tiered Preparedness and Response can be continually improved, further ensuring all stakeholders are prepared and ready to respond.

The OPRC Convention sets out an accepted international framework for governments to develop national contingency plans and the Tiered Preparedness and Response approach by industry mirrors this process. Each is based on developing levels of preparedness in the most efficient and effective manner possible. It is only through working together in a cooperative and collaborative way, that risks can be fully assessed, response options agreed amongst stakeholders and appropriate levels of preparedness set in place, ready for response.

When an oil spill occurs, the resources at each level would be considered as potentially available. Conventionally it was envisaged that the next higher tier of preparedness would be mobilized only if the current level of capability was likely to be exceeded. Experience has shown this to hold true generally when considering the provision of specialized response equipment. However, as Tier 2 and Tier 3 resources have evolved over the years, greater emphasis has been placed on the provision of experienced responders, able to support and even guide a response, harnessing the best of local equipment and other resources, and supplementing them regionally and internationally as and when necessary.

The way in which the tiered arrangement is used in practice therefore varies considerably depending on the circumstances and factors influencing decision-makers at the time of an oil spill. Starting with a Tier 1 spill, for which response actions can be fairly well prescribed in advance, the Tiered Preparedness and Response system offers the most efficient way of setting appropriate higher levels of preparedness, and then calling on them for a response, in an entirely flexible manner.

Critical features for response integration

During an oil spill, there are several critical features that must be addressed for the resources at the different tiers of preparedness to be brought together effectively.

Critical features for response integration	
Spill assessment	When an oil spill occurs, an accurate and rapid assessment is needed of the initial spill and its potential scale and severity. Tools, such as checklists with pre-set questions and indicators are very helpful as a guide for operational staff to make a reliable first assessment and report. Sometimes the details are not clear at the outset and industry best practice suggests a conservative over-response as a precaution, backed up by rapid and intense investigation to clarify the situation and confirm the appropriate level of response requirements.
Notification and mobilization	Throughout all tiers of preparedness, clear procedures are vital for the accurate reporting of an oil spill to response and stakeholder organizations, with pre-agreed procedures for their involvement. Upon receipt of such notification, these organizations must themselves have clear procedures for mobilizing appropriate resources in a response.
Management roles and responsibilities	Prior to an oil spill, there must be pre-agreed arrangements for the likely engagement of the different organizations, including Tier 1, Tier 2 and Tier 3 responders, local and national government, stakeholders, environmental groups and many others. Their respective motivations and drivers, roles and areas of responsibility will vary considerably depending on the nature and scale of a particular spill. At the Tier 1 level, the oil facility operator is commonly regarded as the party managing and controlling the response. Beyond Tier 1 the leading party is often less clear and there are many approaches for directional or more collaborative styles of response management. Where there is a national significance to an oil spill, and also particularly for ship-sourced spills for which there may be little or no resources available from the 'operator', prime responsibility generally rests with the local, provincial and national government agencies. Critical to the successful management of such a significant spill, is the structure and arrangements adopted to draw all stakeholders together and to integrate the people and equipment available from all three tiers.
Cascading in and integrating resources	<p>On the original premise of tiered preparedness being viewed simply as a function of the size of a spill, a focus developed over the years on the provision of specialized response equipment. Whilst the equipment held at Tier 2 and Tier 3 will indeed be commensurately larger, both in terms of the number of items and also their variety and overall capability, a more balanced view has recently emerged that a Tier 2 or Tier 3 response may call on the mobilization of a variety of both specialized and non-specialized equipment resources together with expert human resources. The value of having relatively few Tier 2 options and Tier 3 providers is that the investment in such specialized and rarely used resources is as cost-effective and response-effective as possible. The actual selection of resources needed for a particular oil spill will be determined by the factors influencing how the oil spill unfolds and what reasonable response measures would be best to employ.</p> <p>Given the emergency nature of such oil spills, time is of the essence and a whole range of logistical arrangements need to be in place for the effective integration of response resources. The resources themselves need to be stored in a manner that allows rapid mobilization, easy transportation and handling, able to be fast tracked through customs if crossing international borders, and to be received, stored, staged and deployed rapidly in the field. The specialist operators of this equipment, together with any expert advisors and other technical specialists, also need maximum support from those organizations mobilizing them. This may include a whole range of immigration, transportation, accommodation, potentially translation and other welfare arrangements to ensure these response providers are in a position to be able to contribute effectively. A range of non-specialized resources, that would likely be available from local sources, also needs to be pre-identified and arrangements made in advance for their mobilization.</p>

CONCLUSIONS

Applying the principles of *Tiered Preparedness and Response* during contingency planning can ensure suitable capabilities are developed, commensurate with the oil spill risk at local, regional, national and international levels.

When establishing tiered capabilities and setting *boundaries* between tiers, consideration must be given to all of the *factors* that characterize a particular situation, focusing on those perceived of greatest importance to the stakeholders involved.

The definition of individual tiers is entirely flexible, depending on both the risks (likelihood of events and consequences) and the most effective means of building response capabilities to suit. Generally however:

- **Tier 1** events are likely to be relatively small and/or affect a localized area. They may be dealt with best using local resources, often pre-positioned close by, and managed by the operator.
- **Tier 2** events are more diverse in their scale and by their nature involve potentially a broad range of impacts and stakeholders. Correspondingly, Tier 2 response resources are also varied in their provision and application. Management responsibilities are usually shared in a collaborative approach and a critical feature is the integration of all resources and stakeholders in the response efforts.
- **Tier 3** events are rare but have the potential to cause widespread damage, affecting many people and overwhelming the capabilities of local, regional and even national resources. Tier 3 response resources are concentrated in a relatively few locations, held in readiness to be brought to the country when needed. Such significant events usually call for the mobilization of very substantial resources and a critical feature is their rapid movement across international borders and the integration of all resources into a well organized and coordinated response.

By drawing on the principles of the Tiered Preparedness and Response approach and the OPRC Convention, industry and government have an internationally recognized, efficient and highly effective framework for building preparedness and response capabilities to match the oil spill risks prevailing in any situation worldwide.

ILLUSTRATIONS

The Tiered Preparedness and Response approach is the most effective way of assimilating a diverse range of issues and building an efficient oil spill response capability commensurate to the level of risk. This report has described the way in which oil spill incidents can be viewed and shown how a range of issues and factors can influence the levels of response capability needed and the boundaries between them.

The Illustrations on the following pages draw out just some of these features to demonstrate the variety and complexity of issues that may need to be addressed. They have been based on four contrasting operations from different industry sectors: an offshore production platform; an oil tanker; an on-land pipeline; and an oil handling facility.

Building on the principles in this report of establishing the most appropriate level of preparedness for each given situation, the Illustrations focus on one oil spill event, and show how various factors can strongly influence the course of a response. In essence, the Illustrations are intended to prompt thought and further discussion in order to give the reader insight into how to apply the principles of Tiered Preparedness and Response and tackle the complexity surrounding oil spill incidents.



Different industry sectors will each present a variety of oil spill risks and factors to consider in the design of appropriate response arrangements.

ILLUSTRATION A: OFFSHORE PRODUCTION PLATFORM

- International oil company developing oil reserves with newly established state-owned partners.
- Production platform located offshore.
- Surrounding waters are productive fishing grounds and feeding areas for internationally important seabird populations.

Preparedness

- | | |
|---------------|---|
| Tier 1 | Operator responsible for oil pollution within 500 m of platform. Supply vessels have dispersant application capabilities. Crews have undergone basic oil spill response training. |
| Tier 2 | National government requires operators to subscribe to a region-wide Tier 2 aerial reconnaissance and dispersant application capability. |
| Tier 3 | The international oil company operator has membership access to a Tier 3 Response Centre. |



Event

- Accidental discharge of crude oil during daylight hours.

Scenario

- Several tens of tonnes of persistent crude oil drift away from platform in direction of coastline.
- Slick breaks into patches, scattering over an increasingly wide area beyond the 500 m limit of the platform.
- Modelling predictions indicate possible shoreline impact if no response is undertaken.

Response

- | | |
|---------------|---|
| Tier 1 | Initial dispersant application from supply vessel is effective near to platform, but encounter rate drops as slick breaks up and migrates beyond 500 m limit. |
| Tier 2 | From the outset Tier 2 service is put on standby. Operator mobilizes aerial surveillance during initial stages to confirm predictions and Tier 1 effectiveness. Tier 2 aerial application of dispersant is then conducted within and beyond 500 m limit. Successful outcome: Majority of oil dispersed and remainder naturally dissipates. Impact on seabirds is minimal and only minor disruption to fishing activity. |
| Tier 3 | No requirement for Tier 3 resources. |

Potential influence of factors

- Aerial Tier 2 service could have been delayed, perhaps due to weather or flight permit restrictions. Once airborne and dispersant spraying had been conducted, shoreline impact may still have occurred due to the time lag, calling for Tier 3 resources to be mobilized.
- Had a supplementary, but untested in-country Tier 2 service been available for at-sea containment and recovery and shoreline clean-up, the platform operator could have engaged them, but it is likely they would also mobilize response experts from the Tier 3 Response Centre to supplement and support this Tier 2 provider.
- If no Tier 2 services existed, the Tier 1 capability would need to be extended. In this case, the Tier 3 Response Centre would have been put on standby at the initial stage and if it became apparent the spill was beyond Tier 1 capability, Tier 3 equipment and technical experts would have been mobilized to conduct an at-sea response and to prepare for shoreline clean-up.
- Had the oil been less persistent, and weather conditions and sea state encouraged natural dissipation, only monitoring would have been required. Depending on the circumstances this would be conducted using Tier 1 resources, i.e. observations from supply vessels, and using the Tier 2 surveillance option.
- Approval for extensive dispersant application may not have been in place and no dispersant policy formulated in the national contingency plan. In such a situation a lack of clarity in designated authority responsibilities can lead to uncertainty and delays in permit procedures and approvals. In this Illustration the operator would then need to have considered alternate strategies for at-sea and shoreline response.

This Illustration shows various features of Tiered Preparedness and Response. It is not intended as a prescriptive model nor indicative of any particular country or situation. It simply serves to illustrate the complexity surrounding oil spill incidents, and to prompt thought and further discussion.

ILLUSTRATION B: OIL TANKER

- Laden tanker caught in a severe storm seeks refuge at a nearby port close to an international boundary.
- No other ports or any major oil handling operations are close by.
- Coastline is varied with cliffs, sandy beaches and river deltas. A range of sensitive resources exist, including mariculture, fishing villages, and coastal nature reserves.

Preparedness

- | | |
|---------------|---|
| Tier 1 | A SOPEP (shipboard oil pollution emergency plan) is in place onboard. The port has resources for minor spills from oil handling activities within defined port limits. |
| Tier 2 | Local and provincial government authorities have a network of mainly basic shoreline clean-up resources, and have pre-designated sites for protection at nature reserves. |
| Tier 3 | Government has a national oil spill contingency plan and a moderate stockpile of specialist equipment, but no bilateral agreement with neighbouring countries. |



Event

- Tanker suffers shell plate damage to one of its cargo tanks releasing oil before entry to port.

Scenario

- More than a thousand tonnes of persistent oil is lost before vessel enters port.
- In port, cargo is offloaded to prevent further loss.
- Oil drifts to shore over several days, along tens of kilometres of coastline.
- Large-scale coastal impact: Mariculture stock and facilities affected; and local fishing activity interrupted and fishing boats, nets etc. oiled. Concerns raised over potential impacts to nature reserves.
- Coastal areas of neighbouring country threatened.

Response

- | | |
|---------------|--|
| Tier 1 | Vessel Master notifies national authorities in accordance with SOPEP. Port entrance boomed to prevent further spread of oil from vessel. Successful containment and recovery conducted in the port area. |
| Tier 2 | Local government authorities mobilize resources to address priority sites at nature reserves and various shoreline areas in advance of support arriving from Tier 3 options. Wider impacts cannot be addressed with available Tier 2 capabilities. |
| Tier 3 | National government takes lead role in directing at-sea and shoreline response using national stockpile supplemented by non-specialized local resources and also volunteers. Additional equipment and operational support sourced, under contract, from international Tier 3 Response Centre. Neighbouring country requests assistance to protect their coastal areas, but the absence of a bilateral agreement severely restricts mobilization. |

Potential influence of factors

- Beyond the port limits (Tier 1), if no Tier 2 arrangements had been in place then reliance would be placed on Tier 3 resources from the outset. As well as some additional impact occurring to possibly the most sensitive coastal areas, the integration of Tier 3 resources would potentially be hampered by the absence of a pre-planned local network of logistical support.
- In the case of a 'passing tanker scenario', where perhaps no Tier 1, Tier 2 or national Tier 3 resources had existed, an international response effort would need to have been mounted. Most commonly led by the national and local government agencies, this would have been supported in various ways by a range of local and international organizations and Tier 3 resources. A major response would have drawn in a range of specialized and non-specialized equipment and logistical support together with trained Tier 3 responders and local untrained and volunteer personnel from a wide area. A national oil spill contingency plan would greatly assist the integration of all of these stakeholders and resources.
- Had a bilateral agreement existed with the neighbouring country, that encompassed response policies and plans, together with mechanisms for calling on and providing mutual advice and assistance, this would have facilitated the extension of existing governmental capabilities to assist in protecting the neighbouring country's coastal areas.

This Illustration shows various features of Tiered Preparedness and Response. It is not intended as a prescriptive model nor indicative of any particular country or situation. It simply serves to illustrate the complexity surrounding oil spill incidents, and to prompt thought and further discussion.

ILLUSTRATION C: ON-LAND PIPELINE

- Domestic oil industry with ageing infrastructure working in partnership with international oil companies to redevelop national reserves.
- Continental pipeline from inland production field extends hundreds of kilometres across neighbouring countries to marine export terminal. Pipeline crosses a variety of mountainous and lowland agricultural areas, crossing many rivers and wetlands of environmental significance.
- Intermediate pumping stations are sited at local villages along the route. Pipeline is buried in some areas but runs above ground in others, including at river crossings and wetland areas.

Preparedness

- | | |
|---------------|---|
| Tier 1 | Pumping stations have identical containers of equipment for limited containment, recovery, pumping and storage, and some basic hand-tools. Designated production field and export terminal operatives are trained in basic response techniques. |
| Tier 2 | Arrangements in place with local companies in each country, for basic earth moving machinery and other non-specialized equipment. |
| Tier 3 | The international oil company operators have membership access to a Tier 3 Response Centre. |



Event

- Rupture during excavation work by local construction company at site close to a village.

Scenario

- Automatic detection system is triggered and oil pumping is shut down.
- Oil quickly lost from damaged section spreads across construction site and surrounding area. Ongoing flow from pipe steadily decreases.
- Initial spill estimated at more than two hundred tonnes but ongoing loss makes total quantity difficult to assess accurately.

Response

- | | |
|---------------|--|
| Tier 1 | Nearest Tier 1 resources are mobilized to pump free oil in natural collection areas to temporary storage. |
| Tier 2 | Operator mobilizes Tier 2 contractor. Construction equipment is used to build berms that contain ongoing losses from pipeline and to prevent oil migrating from affected area. Tier 2 contractors work with pipeline operators to put in place temporary measures to patch the ruptured pipe section. Local waste management options are sought for disposal of liquid oil and oily waste materials. |
| Tier 3 | Tier 3 Response Centre is put on standby, but not mobilized. |

Potential influence of factors

- An absence of any Tier 2 option would have led to a Tier 3 Response Centre being mobilized. In practice, locally sourced, mainly non-specialized equipment and untrained personnel would still have offered the most appropriate response solution. Tier 3 specialist responders would then have been used to guide the strategy, support locally available contractors that were sourced by the pipeline operator, and monitor standards of clean-up.
- Oil entering a river or wetland area would have significantly increased both the scope of the spill and the potential impacts. Tier 1 and Tier 2 resources would have provided an initial response before being overwhelmed and more specialized equipment from the Tier 3 Response Centre, together with response personnel, being needed. The response would also have taken substantially longer to complete.
- The variability in both availability and capability of local contractors would have influenced the level of Tier 2 over the length of the pipeline and also between different countries. Depending on the location of such an event, many different scenarios and response issues could therefore have arisen, with reliance on Tier 3 resources being greater in some areas than others.
- Potential ground contamination issues and the need for remediation could also have arisen, calling for specialist expert technical assistance.

This Illustration shows various features of Tiered Preparedness and Response. It is not intended as a prescriptive model nor indicative of any particular country or situation. It simply serves to illustrate the complexity surrounding oil spill incidents, and to prompt thought and further discussion.

ILLUSTRATION D: OIL HANDLING FACILITY

- Oil handling facility receives oil imports from tankers mooring at own jetty. Facility processes and refines products for onward distribution, principally via road network.
- A number of similar oil handling facilities operate in the vicinity, all located within an industrialized area of a large estuary overseen by a Harbour Authority.
- Undeveloped parts of the estuary have sensitive habitats that support a variety of wildlife.

Preparedness

- | | |
|---------------|---|
| Tier 1 | Booms at jetty are sufficient to deflect oil away from nearby sensitive areas. Basic equipment is available for on-land oil spills including pumps and temporary storage. Designated facility personnel suitably trained. |
| Tier 2 | Small vessels and containment and recovery equipment are held by the Harbour Authority for oil released into the estuary within harbour limits. Mutual aid agreement is in place between oil handling facility operators for road tanker accidents on public roads. |
| Tier 3 | The operator has membership access to a Tier 3 Response Centre. |



Event

- Storage tank rupture due to structural failure.

Scenario

- Several thousand tonnes of heavy crude oil released.
- Bunded area sufficient to contain full volume of storage tank.
- All spilled oil is contained.

Response

- | | |
|---------------|--|
| Tier 1 | Oil spill contained and Tier 1 resources are sufficient to respond, with oil pumped to adjacent storage tanks. |
| Tier 2 | No additional support required. |
| Tier 3 | No additional support required. |

Potential influence of factors

- | | |
|--|--|
| <ul style="list-style-type: none"> ● If a drain valve had been inadvertently left open, oil held within the bunded area could have entered the drainage system. Depending on general site management and controls, this could have been discharged to the estuary, with the potential to affect environmental resources further upstream or downstream. In this case, Tier 2 resources from the Harbour Authority would need to have been mobilized. ● If there was a rapid structural failure, a surge of oil released from the tank could have overtopped the bund and then spread across surrounding areas. Business operations would need to be interrupted until safe working conditions had been restored. | <p>Depending on the nature and extent of oiling, additional pumping, storage and clean-up resources may have been required beyond the Tier 1 provisions, possibly through the mutual aid agreement for road tanker spills, or from the Tier 3 Response Centre.</p> <ul style="list-style-type: none"> ● Had the oil been volatile, safety considerations would have seriously restricted the response and possibly called for business operations to be halted and areas of the site evacuated, until the situation had been rendered safe. In this case, the response would have involved many more facets of the facility's crisis management plan than principally just the oil spill element. |
|--|--|

This Illustration shows various features of Tiered Preparedness and Response. It is not intended as a prescriptive model nor indicative of any particular country or situation. It simply serves to illustrate the complexity surrounding oil spill incidents, and to prompt thought and further discussion.

ACKNOWLEDGEMENTS

This report was prepared by Richard Santner and David White of Oil Spill Response and East Asia Response Limited (OSRL/EARL) for the International Petroleum Industry Environmental Conservation Association (IPIECA).

The IPIECA Task Force included:

Bernie Bennett (BP)
Hannah Buckley (IPIECA)
Jim Clark (ExxonMobil)
Richard Johnson and Hugh Parker (ITOPF)
Marine Julliard and Dirk Martens (Total)
Cassandra Richardson (Shell)
Paul Schuler (CCA)
Dave Salt (OSRL/EARL)
Ivan Skibinski (AMOSC)
Peter Taylor (OSPRI)

Photographs are reproduced courtesy of the following:
pages 4 (top), 5 (right), 16 and 23: ITOPF; pages 4 (bottom left and right),
8 (bottom), 11, 21, 22, 24 and 25: Shutterstock; pages 5 (left) and 9:
iStockPhoto; page 8 (upper): Jenny Owens; page 13 (top): Total;
page 13 (bottom): OSRL/EARL; pages 14 and 17: ©2007 Jupiterimages
Corporation; page 18: IPIECA.

FURTHER READING

International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990 (International Maritime Organization, 1991)

The International Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (OPRC 90) is the international instrument that provides a framework to facilitate international cooperation and mutual assistance in preparing for, and responding to, major oil pollution incidents and to encourage States to plan and prepare, by obligating Parties to develop national-level emergency response systems and to maintain adequate capacity and resources to address oil pollution incidents. For more information, please visit www.imo.org.

OPRC-HNS Protocol 2000 (International Maritime Organization, 2000)

This publication reproduces the texts of the Final Act of the Conference, including its Attachments, and the Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000. For more information, please visit www.imo.org.

IPIECA Report Series

The IPIECA Report Series on Oil Spill Preparedness and Response was first started in 1990 and continues to grow, addressing a broad range of oil spill related issues. The 17 reports in the series focus on various aspects of contingency planning, spill response and the impacts of oil spills on the environment. The reports represent a consensus of industry views on good practice in oil spill preparedness and response. A number of the reports have been produced in collaboration with the International Maritime Organization (IMO) and the International Tanker Owners Pollution Federation (ITOPF). The majority of the series are available in English, French, Spanish and Russian. Some reports are also included in Italian, Chinese and Japanese. The entire series is summarized in the 'Oil Spill Report Series Summary' publication. Please visit the IPIECA website on www.ipieca.org to access the complete oil spill report series.

IMO Manuals

These Manuals published by the International Maritime Organization (IMO) provide guidance to governments, particularly in developing countries, on oil pollution preparedness, response and cooperation. There are six manuals in the series:

- *Manual on Oil Pollution, Section I—Prevention* (out of print)
- *Manual on Oil Pollution, Section II—Contingency Planning* (International Maritime Organization, 1995)
- *Manual on Oil Pollution, Section III—Salvage* (International Maritime Organization, 1997)
- *Manual on Oil Pollution, Section IV—Combating Oil Spills* (International Maritime Organization, 2005)

Continued ...

Further Reading *(continued)*

- *Manual on Oil Pollution, Section V—Administrative Aspects of Oil Pollution Response* (International Maritime Organization, 1998)
- *Manual on Oil Pollution, Section VI—IMO Guidelines for Sampling and Identification of Oil Spills* (International Maritime Organization, 1998)

For more information, please visit www.imo.org.

ITOPF Technical Information Papers

The International Tanker Owners Pollution Federation Limited (ITOPF) Technical Information Papers comprise a series of twelve papers, each covering a specific topic in a concise manner:

- *Aerial Observation of Oil at Sea*
- *Fate of Marine Oil Spills*
- *Oil Spill Effects on Fisheries*
- *The Use of Chemical Dispersants to Treat Oil Spills*
- *Use of Booms in Combating Oil Pollution*
- *Use of Skimmers in Combating Oil Pollution*
- *Recognition of Oil on Shorelines*
- *Shoreline Clean-up*
- *Disposal of Oil and Debris*
- *Contingency Planning for Oil Spills*
- *The Effects of Marine Oil Spills*
- *Action: Oil Spill*

For more information please visit www.itopf.com.

Industry Technical Advisory Committee (ITAC)

The Industry Technical Advisory Committee (ITAC) is drawn from oil industry not-for-profit response organizations and other bodies that have oil pollution response and preparedness as their principal goals. The purpose of ITAC is to act as a focal point for technical issues of interest to member organizations and the wider response community, and as a forum for information exchange. Key areas of interest include spill response techniques, technological developments, operating in extreme environments and responder training. For more information, please visit www.industry-tac.org.

Contact details for Tier 3 Centres

The contact details for Tier 3 centres worldwide may be accessed via the following link on the IPIECA website: www.ipieca.org/activities/oilspill/tier_centres/links.php.

IPIECA is the single global association representing both the upstream and downstream oil and gas industry on key environmental and social issues, including: oil spill response; global climate change; fuels; biodiversity; social responsibility and sustainability reporting.

Founded in 1974 following the establishment of the United Nations Environment Programme (UNEP), IPIECA provides a principal channel of communication with the United Nations. IPIECA Members are drawn from private and state-owned companies as well as national, regional and international associations. Membership covers Africa, Latin America, Asia, Europe, the Middle East and North America.

Through a Strategic Issues Assessment Forum, IPIECA also helps its members identify emerging global issues and evaluates their potential impact on the oil industry. IPIECA's programme takes full account of international developments in these issues, serving as a forum for discussion and cooperation, involving industry and international organizations.

Company Members

BG Group
BHP Billiton
BP
Chevron
CNOOC
ConocoPhillips
ENI
ExxonMobil
Hess
Hunt Oil
Hydro
Kuwait Petroleum Corporation
Mærsk Olie og Gas
Marathon
National Hydrocarbon Corporation of the Republic of Cameroon
Nexen
NOC Libya
OMV
OXY
Petrobras
Petroleum Development of Oman
Petronas
Petrotrin
PTTEP
Repsol YPF
Saudi Aramco
Shell
Statoil
TNK-BP
Total
Woodside Energy

Association Members

American Petroleum Institute (API)
Australian Institute of Petroleum (AIP)
Canadian Association of Petroleum Producers (CAPP)
Canadian Petroleum Products Institute (CPPI)
CONCAWE
European Petroleum Industry Association (EUROPIA)
Institut Français du Pétrole (IFP)
International Association of Oil & Gas Producers (OGP)
Petroleum Association of Japan (PAJ)
Regional Association of Oil and Natural Gas Companies in Latin America and the Caribbean (ARPEL)
South African Petroleum Industry Association (SAPIA)
World Petroleum Council (WPC)



International Petroleum Industry Environmental Conservation Association
5th Floor, 209-215 Blackfriars Road, London, SE1 8NL, United Kingdom
Telephone: +44 (0)20 7633 2388 Facsimile: +44 (0)20 7633 2389
E-mail: info@ipieca.org Internet: www.ipieca.org